The Canadian Entomologist

VOL. LVII. ORILLIA, OCTOBER, 1925. No. 10.

# OBSERVATIONS ON TRIPPING OF ALFALFA BLOSSOMS.

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There are a great many factors that govern the production of alfalfa seed and one of the most important of these is the tripping of the blossoms. The term tripping is applied to that mechanism of the blossom which causes the pistil to spring violently against the back of the corolla tube bringing the stamens with it. This violent jarring causes the pollen to be shaken off the anthers and spreads it over the top of the pistil and the back of the tube, insuring the fertilisation of the blossom and the subsequent production of the seed. Under most conditions it is generally conceded that tripping can only be brought about by the introduction of some foreign body behind the keel of the blossom as is done when one of the bumble bees or any other long-tongued bee is searching for nectar. In such a case the tongue is inserted back of the keel of the blossom and far enough down into the tube to cause the blossom to trip. The same result can be obtained by thrusting a straw or a toothpick into the corolla tube.

Under some special conditions of temperature and humidity, which need more detailed study, the blossoms trip very readily. It is generally believed that a few days of exceptionally warm weather at a time when the blossoms are fully formed tend to reduce the water content in the cells of the keel of the flower and increase the ease of tripping. A great deal of work has been done to determine ways and means of insuring the tripping of blossoms and several different machines and drags have been tried to act as mechanical trippers. Some of these machines have shown promise but the greater number have been discarded. It is a recognised fact that insects play an important part in the production of alfalfa seed because of the ability of some of the bees to trip blossoms but at the same time a great deal of credit is given to other agencies such as wind and weather.

In a discussion of tripping the weather leading up to the mature blossom is taken for granted. It must be remembered that favorable weather with sufficient soil moisture is necessary to produce blossoms. If the soil has an opportunity to dry out during the period from the starting of the buds to the mature blossom there will be a great many buds that are blasted and these drop before the stalk is half grown. Various plots under test were observed during this period and there is a distinct and direct correlation between the available soil moisture and the number of blossoms produced.

There is some evidence of automatic tripping of blossoms though this has never been observed in any of these studies. Some agronomists state that the correct weather conditions will cause the blossoms to trip without any other factor being introduced and without any mechanical assistance. Alfalfa blossoms have been caged in a great variety of cages including screen wire, cloth, wirecloth, glass and mica and under a great variety of light, temperature and moisture

conditions but no automatic tripping has been observed. Under the conditions which seemed to be most favorable for the tripping of blossoms in the field there also seemed to be the same ease of tripping in the cage but there is so much room for error in attempting to determine the amount of pressure required to trip blossoms by hand that such evidence is useless. It is possible that even the most open cages may have a different humidity than the atmosphere in the open field and this difference might be enough to prevent automatic tripping.

In order to determine just what value the wind plays as a mechanical agent in tripping blossoms an experiment was arranged using two cages. One of these was made of ordinary mosquito wire and had the top covered over to make it as nearly insect-proof as possible without seriously interfering with the wind influence. The other cage was made with an open top but the sides were covered with a heavy cotton cloth which excluded the wind. These cages were eight by ten feet with the walls three feet high and were big enough to enclose three rows of alfalfa. In order to reduce the experimental error to the minimum only the central portion of the middle row was used for observation. It was feared that the border plants in the cages would be influenced by the walls of the cages and especially where the wind could blow the plants against the side of the cage it was feared that the additional mechanical advantage of having some solid object against which to jar the blossoms would cause a heavier tripping than would ordinarily occur in the open field.

Observations were made frequently and under all kinds of wind and weather conditions. The first blossoms appeared soon after the cages were set out and the two plots apparently produced blossoms equally well. At no time did there seem to be any difference in the numbers and strength of blossoms produced nor was there anything to indicate that the cages were in any way influencing the growth and development of the plants. Insects were observed in the open cage just as often as they were found in the field. There were several windy days when the wind reached a velocity of over 30 miles per hour and on one day the velocity reached 60 miles. On these days the plants in the screen cage were bent and batted about as much as those in the field but the plants in the cloth cage were barely moved. Many of these windy days were days when the blossoms tripped easily when tested by hand and if the wind could act as a mechanical agent in tripping there should have been a fair number of blossoms tripped everywhere.

The cages were removed from the field early in September when practically all of the blossoms were gone and the seed crop was set. There was a remarkable contrast between the seed crops in the two cages. In the insect proof cage there were only three or four seed pods and these were on plants that were close to one wall. None of the plants in the center which were the ones for special observation bore a single seed pod. The wind proof cage held plants that were well loaded with seed. Fully 75% of the blossoms were tripped and bore seed pods with as high as eight and ten seeds in them. The crop of seed in this cage was almost equal to that on the uncaged portions of the field where the set of seed was heaviest and was better than the average set for the entire field. While the results from these two cages would indicate that the wind possesses no value whatever as a tripping agent there is no doubt that under certain pecu-

liar circumstances the wind is responsible for a great deal of tripping. The most marked of such conditions are instances where the plants are somewhat isolated with heavy brush or shrubbery close enough so that the wind will cause the blossoms to be brought into direct contact with the hard branches. The same condition is brought about when an isolated plant or one row of plants grow up close to a wire fence so that the branches are twined among the wires. There is also some evidence that the wind is an important factor where the plants are isolated in an open field and there is ample opportunity for the wind to force the outer stems against the ground but there are several other factors which may also govern the setting of the seed in these circumstances.

Collections of insects and observations made on the insects visiting the blossoms have proven the long tongued bees to be the most persistent blossom trippers. The bumble bees are perhaps the most plentiful of these but the leaf-cutter bees are just as important when they are present. Either of these groups will visit the flowers and invariably when an individual has left a blossom it is found to be tripped. At times when the blossoms are in ideal tripping condition it is not uncommon to find that the mere impact of the heavy bumble bee with the vibration caused by its wings is sufficient to trip several of the blossoms in the spikelet. This is not so true of the lighter leaf-cutter bees as their impact is not so forceful and the vibration of their wings is much less violent. Several of the larger species of syrphids are persistent visitors among the blossoms but none have been observed actually tripping though in one or two instances blossoms were found tripped, evidently by the fly's feet and not through any direct feeding.

Honey bees have been observed visiting flowers and securing nectar but they do not possess a tongue long enough to reach to the bottom of the corolla tube when introduced over the top of the keel. The result is that the honey bee pokes its tongue into the base of the corolla tube from about half way down, reaching around the keel and not tripping the blossom. This has been observed repeatedly at a time when the blossoms were in ideal tripping condition but only once has a blossom been known to have actually tripped by a honey bee feeding. On one or two occasions blossoms have been tripped by the honey bee crawling over them but these occasions are very rare.

Observations made at the Lethbridge Laboratory indicate that the wind is a very poor factor in tripping alfalfa blossoms and is of value only in the most unusual cases. Since these observations cover a great many different weather conditions they have shown that there are certain conditions that tend to facilitate tripping and with these at an optimum the wind may act as an aid to mechanical tripping. The most valuable insects observed are the long-tongued bees such as the bumble bee and the leaf-cutter bee which trip every blossom they visit. The honey bees are practically useless from the standpoint of alfalfa seed production and any tripping acomplished by them is accidental as is also the case with some of the large flies that frequent alfalfa blossoms.

# A STUDY OF THE *NOTONECTA MEXICANA* A. & S. SERIES WITH DESCRIPTIONS OF NEW SPECIES (HEMIPTERA-NOTONECTIDAE.)

BY H. B. HUNGERFORD,

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Amyot and Serville (1843), in their "Histoire Naturelle des Insectes Hemipteres", page 453, described a Notonecta species from Mexico and on plate 8 figured it natural size in color. The description was very brief (two lines) and the figure too small to give one much confidence in its worth as an aid in the recognition of the species. The authors doubtless thought that the red color was quite sufficient to distinguish their *Notonecta mexicana*.

Kirkaldy in his "Revision of the Notonectidae", Transactions of the Entomological Society of London 1897, page 40, says that the type of *N. mexicana* A. & S. appears to be lost. An inadequate description and a lost type are an unsatisfactory heritage at best! In this case, however, the writer has six species that, allowing some variation in size, might be the one that Amyot and Serville had before them.

Fieber in his "Rhynchotographieen", pp. 474-475, describes two species from Mexico, *N. klugii* and *N. impressa* and suggests that *N. mexicana* Am. & Serv. "durfte wohl nur eine Varietat der oben beschriebenen *N. klugii* sein, oder zur folgenden gehoren," (referring to *N. impressa*.) Kirkaldy disposes of Fieber's species by placing *N. klugii* Fieb. under *N. mexicana* A. & S. and *N. impressa* Fieb. under *N. insulata* Kirby. It is most unfortunate that Dr. Kirkaldy sometimes offered synonymic notes as dogmatic statements of fact without giving the evidence upon which he based his conclusions. Without doubt this seemed to him sufficient, but leaves an investigator with an unhappy feeling of uncertainty. This practice compels a searching review of each case to determine the correctness of his judgment in spite of his well deserved recognition as a great hemipterist. In his study of the Notonectidae he made every effort to examine all types possible and studied all the material he could secure from every land. Much of this was still in his possession at his untimely death. These collections are now deposited in the United States National Museum at Washington where the writer, through the assistance of Doctor L. O. Howard and the kindness of Doctor J. M. Aldrich and Mr. W. L. McAtee was permitted to study them.

The study herein set forth is based, therefore, upon a knowledge of the material with which Doctor Kirkaldy worked. No authoritative consideration of the genus could have been made without an examination of Dr. Kirkaldy's collections. In his consideration of *N. mexicana* Dr. Kirkaldy redescribed what he thought to be the true species and then discussed the color variations, suggesting the name *ceres* for the pale colored forms and *hades* for the violet black forms. It may be interesting to note that in his collection I find that the *hades* forms are all males and the *ceres* forms are all females. The shape of the prothorax is somewhat different in these two forms and it may be possible that they are different species. In any event it is necessary to straighten out the synonomy since the above varietal names have been proposed. Dr. Kirkaldy (1897) said that the types of *N. mexicana* A. & S. and of *N. klugii* appeared to be lost. Dr. Champion, 1901, in his "Biologia Centrali Americana," page 369, records the fact that he had ex-

amined and figured a type of *N. klugii* from the Berlin Museum. A study of Champion's figures of Fieber's *N. klugii* and a careful examination of insects studied by Champion himself leads to the conclusion that Dr. Kirkaldy's *N. mexicana* var. *hades* is a synonym of Fieber's *N. klugii*. Many specimens of what Dr. Kirkaldy would call *N. mexicana* var. *ceres* are red and black and in this regard satisfy the color description of the typical *N. mexicana* A. & S. There is a marked tendency in this so-called *Notonecta mexicana* A. & S. group to vary greatly in color. Some may be black with beige trimmings, others will be greenish tan, clay or horn, while in between these extremes we find brightly colored red and black forms. In one catch of 19 specimens of a species described below I find 10 males, all black and 9 females, all pale. Other collections of this species from other places in the same state are red and black in both sexes, the males tending to be darker than the females. This and other distinct species of this greatly confused group are described below:

### **Notonecta lobata** sp. n.

*Size*: Length, 13-14 mm.; width, 4.5 to 5 mm.

*Color*: Typically red and black. Some specimens are brownish black with beige trimmings and others are greenish tan. All have head, pronotum and limbs yellow or gray and scutellum and wing membrane black. The hemelytra, excepting the membrane are typically red. The males of the red forms frequently have the black of the membrane extending forward upon the distal portion of clavus and corium. The pale and dark forms have only the slightest suggestion of red.

*Structural details*: Head large. Vertex : synthlipsis : : 3.5 : 1.3. Pronotum short. Lateral margin slightly sinuate. Anterior half moderately explanate. The genital capsule of the male is very large and distinct from all the other forms of this group. The large lobes on the capsule in front of the claspers are unique. See Figure 3.

Described from 17 specimens presented to me by P. A. Glick and taken by him in the Superstition Mountains, Arizona. I have also typical specimens of this species taken by my friend, Doctor R. C. Moore, State Geologist of Kansas, on a memorable trip with a United States Geological Survey party into the Grand Canyon of Arizona in 1923. Other specimens taken by Doctor Francis Huntington Snow are in our collection. All of the above are of the typical coloring. A collection of 19 specimens from Huachuca Mountains, Arizona, taken by R. D. Camp and belonging to the University of Michigan consists of ten very dark, almost black males, and nine greenish tan females.

### **Notonecta compacta** sp. n.

*Size*: Length, 12.5 mm.; width 4.8 mm.-5 mm. A comparatively short, plump-bodied species.

*Color*: Typically red and black. The head, pronotum and limbs yellow, the latter marked with longitudinal black lines. The scutellum and wing membrane black. The hemelytra red. One of the four specimens from which this description is drawn has the hemelytra black throughout.

*Shape*: Very compactly formed. The head with the vertex : synthlipsis : : 7 : 2. Eyes overlap anterior margin of prothorax which is short. Lateral margins of prothorax strongly constricted about the middle. The anterior lateral margin greatly explanate and deflexed. Last ventral abdominal plate of female

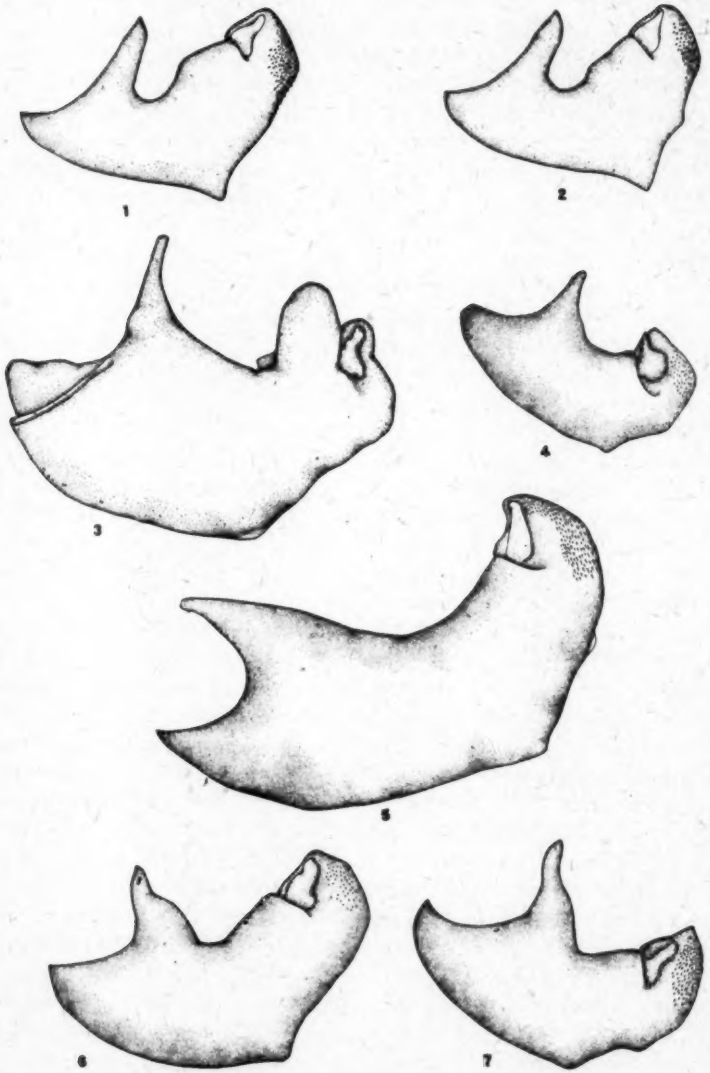


Figure 1. Male genital capsule of *Notonecta insulata* Kirby. Minn.
Figure 2. Male genital capsule of *Notonecta kirbyi* sp. n. Utah.
Figure 3. Male genital capsule of *Notonecta lobata* sp. n.
Figure 4. Male genital capsule of *Notonecta distincta* sp. n.
Figure 5. Male genital capsule of *Notonecta macrocephala* sp. n.
Figure 6. Male genital capsule of *Notonecta hoffmani* sp. n.
Figure 7. Male genital capsule of *Notonecta klugii* Fieb. (*Notonecta mexicana* var. *hades* Kirkaldy).

broad and short.

Described from four females from Mexico. Type in United States National Museum. Other three specimens were taken at Colima, Mexico, by L. Conradt.

**Notonecta distincta** sp. n.

*Size*: Length 11 mm.; width 3.4 mm.

*Color*: Head, pronotum and limbs yellow. Scutellum black, hemelytra and membrane reddish yellow. Corium and membrane overcast with violet.

*Structure*: The eyes separated by broad synthlipsis; vertex : synthlipsis : : 3 : 2. The inner margin of eyes thus appearing more nearly parallel than in most Notonecta. Lateral margins of prothorax straight, slightly explanate throughout. The genital capsule as shown in Figure 4.

Described from a single male found in the Uhler collection and bearing the label Comandu, Lower California, Mexico, Chas. D. Haines, March 1889.

**Notonecta macrocephala** sp. n.

*Size*: Length, 13 mm.; width, 4.3 mm.

*Color*: Head, pronotum, limbs, and costal margin of hemelytra yellow; hemelytra dark red suffused with some black. Membrane violet black. Scutellum black. Limbs striped with brownish black lines.

*Structure*: Eyes large; head thus appearing unusually large. Vertex: synthlipsis : : 3.1 : 1. Lateral margins of thorax sinuate and somewhat flattened and deflexed on anterior half. Genital capsule very large and shaped as shown in Figure 5.

Described from a male without locality or collector's label, but doubtless comes from Mexico.

**Notonecta hoffmani** sp. n.

*Size*: Length, 11 mm.; width, 4 mm.

*Color*: Orange-red and black to horn and black. Head, pronotum and limbs, yellow. Scutellum, black. Membrane from dusky to brownish black.

*Structure*: Eyes prominent. Vertex : synthlipsis : : 3.2 : 1. Lateral margins of pronotum nearly straight, faintly sinuate and somewhat explanate on exterior two-thirds. Anterior lateral angles rounded. Last ventral abdominal plate of female narrow. Male genital capsule as shown in Figure 6.

This species is smaller than the others of this group and was first recognized as distinct by Professor W. E. Hoffman, now of Canton Christian College, China. I, therefore, name it in his honor. Described from a series of insects from Long Beach, California, taken by C. T. Dodds. Other paratypes from California and Lower California, and Mexico are in the Snow and Uhler collections.

There is one other species that is often red and black and occasionally is found in collections under the name *N. mexicana* A. & S. This has been called *N. insulata* Kirby by most of us. It is specifically distinct from, though closely related to *N. insulata* Kirby. Kirby's species is found all through the east and north while it is replaced in the southwest by a form which we may call *N. kirbyi* sp. n. Color pattern and structure are uniformly different in these two forms. The male genital capsules are shown in Figures 1 and 2 of the accompanying Plate. It is this *N. kirbyi* that Kirkaldy considered *N. impressa* Fieb. However, if Fieber's description is worth anything, it is not possible to harmonize this species with Fieber's description of *N. impressa*.

# EUXOA RIDINGSIANA AND ITS ALLIES (LEPIDOPTERA).*

BY J. MCDUNNOUGH,

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A study of male genitalia has convinced me that several of the close allies of *Euxoa ridingsiana* Grt. have been widely separated from this species in the Barnes and McDunnough 'Check List', following more or less along the lines suggested by Hampson (Cat. Lep. Phal. Brit. Mus., Vol. IV), who has based his sections of the genus *Euxoa* on the structure of the male antennae. *Ridingsiana* Grt. falls into Hampson's Section IV "Antennae strongly serrate and fasciculate" (*Euxoa*); *perolivalis* Sm. into Section V "Antennae minutely serrate and fasciculate" (*Chorizagrotis*), and *flavicollis* Sm. into Section VI, "Antennae ciliated" (*Rhyacia*). For this latter genus Smith's *Rhizagrotis* was substituted in the 'Check List'.

I have always felt that *Chorizagrotis* and *Rhizagrotis*, as used in the 'Check List', contained heterogeneous elements, but at the time the 'List' was prepared no detailed study of the species could be made, and their correct placing was left in abeyance. *Chorizagrotis* must probably be limited to the *auxiliaris* group with the ventral branch of the harpe in the male genitalia long and spoon-shaped, whilst *Rhizagrotis* will contain *cloanthoides* and its allies. However, in the present paper my intention is not to discuss the limitations of these two genera but to point out that the male genitalia of *ridingsiana* Grt., *perolivalis* Sm. and *flavicollis* Sm. resemble each other extremely closely and are all distinctly *Euxoa*-like in character; this similarity of genitalia corresponds with a similarity of pattern in wing markings, and to my mind these two characteristics are sufficient to warrant the removal of *perolivalis* and *flavicollis* from their present position and their placing next to *ridingsiana* in the genus *Euxoa*.

*Euxoa ridingsiana* was described (1875, Bull. Buff. Soc., II, 305) from material taken in Colorado by James Ridings and the type is fairly accurately figured by Hampson (l. c. Pl. LXI, fig. 31); it was redescribed by Smith as *maimes* (1903, Can. Ent., XXV, 131), largely from Calgary material and this latter name was correctly made a synonym of *ridingsiana* by Wolley-Dod (1911, Can. Ent., xliii, 337). Dod's statement that the type material came from the Sierra Nevadas, California, I am unable to reconcile with the localities given by Grote in the original description and imagine some error has been made, unless, indeed, I have overlooked some later reference with corrections.

The species is common all through the Prairie Provinces and in the mountainous districts of British Columbia, extending northward into Alaska; the ground-color of the primaries is deep brown, the cubital vein is distinctly white as far as the reniform, and there is generally a noticeable yellow streak connecting the claviform with the t.p. line. The male antennae are rather weakly serrate and fasciculate, the hairs of the individual fascicles being numerous but quite short. In the male genitalia the harpe is roughly U-shaped, the lower (ventral) branch being short and pointed, the upper one gently sinuate, twice the length of the other one and with rounded apex.

*Euxoa flavicollis* Sm., described from a single female from Montana, is

*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric, Ottawa.

very similar to *ridingsiana* in maculation but can generally be distinguished by the decidedly yellow or yellow-brown costa and basal portion of collar; the male antennae show no serrations and are merely ciliate, although an indication of fascicles of hair is certainly present. The male genitalia show no feature that would clearly distinguish them from those of *ridingsiana*. The distribution of the species seems also to coincide more or less with that of *ridingsiana*.

*Euxoa perolivalis* has, as the name indicates, the primaries of a decided deep olivaceous-gray shade; the maculation is essentially of the same type as that of *ridingsiana* but the costa is generally more evenly and broadly grayish and the cubital vein less decidedly marked in white; in size the species is somewhat larger. The male antennae are intermediate between *flavicollis* and *ridingsiana*, showing practically no serrations but possessing distinct fascicles of hair, scarcely as long as those of *ridingsiana*. The male genitalia are much the same as those of *ridingsiana*, in fact the only slight difference I can note is that the upper branch of the harpe is stouter and less sinuate in *perolivalis;* this feature may readily prove inconstant when more slide material is available for comparison.

Male and female paratypes from Calgary, Alta., are in the Canadian National Collection; outside of a good series from various localities in Alberta I have only a single specimen from the Yukon territory before me.

In Manitoba *perolivalis* is represented by a form which approaches even more closely to *ridingsiana* than the typical form does: this Manitoba race shows no olivaceous tinge in the ground color of the primaries which are a brown almost as deep as in *ridingsiana;* the costa may or may not be pale brown, the cubital vein is only faintly outlined in pale color and the dash connecting the claviform with the t. p. line is frequently absent. As this seems a constant race I propose for it the varietal name MANITOBANA; the *Holotype* being a male from Miniota, Man., Aug. 5, (A. J. Dennis); No. 1483 in the Canadian National Collection, Ottawa; *Allotype*—♀, Cartwright, Man., (E. F. Heath); *Paratypes*—3 ♂, 1 ♀, Cartwright, Man., July 18, 21, Aug. 6; 1 ♂, 1 ♀, Aweme, Man., July 20, 27, (Criddle); 1 ♂, Treesbank, Man., July 18, (J. B. Wallis). Also 2 ♂, 2 ♀, Manitoba, in Coll. Barnes.

Recently I received for identification from Dr. W. C. Cook of the University of Montana, a series of a *Euxoa* which presented the appearance of a bleached *perolivalis*. However, an examination of the antennae showed that they were distinctly serrate and fasciculate and that the hairs composing the fascicles were noticeably longer than those of *ridingsiana*. I was able to match these with a single specimen taken in 1895 by Wolley-Dod at Calgary and now in the Canadian National Collection. The genitalia showed all the characteristics of this present group and only differed from those of *ridingsiana* on very slight characters. As I can find no name applicable to this form and as the antennae show a definite structural difference, I venture to describe the species as new and take pleasure in naming it after the collector, who has contributed greatly to our knowledge of the Noctuid fauna of Montana.

### **Euxoa cooki** n. sp.

*Male*. Head and palpi light ochreous, thorax light gray with a darker bar across the middle of the collar. Primaries pale ochreous with smoky suffusion;

maculation much as in *perolivalis*; a more or less evident black bar from base of wing to t.a. line; reniform and orbicular rather variable in size, pale, with dark centres; s.t. line pale, irregular, rather more bulged centrally than in *perolivalis* and preceded as usual by dark sagittate marks; submedian pale streak scarcely paler than the ground color; terminal space noticeable darker than remainder of wing. Secondaries, whitish, variably sprinkled with smoky and with discal lunule and a broad smoky terminal band, fringes whitish.

*Female.* Rather grayer and with better defined maculation than in the male; the pale submedian streak absent and the pale reniform and orbicular strongly contrasting with the rest of the wing. Basal half of secondaries more sprinkled with smoky than in male. Expanse 30-33 mm.

*Holotype*—♂, Jefferson Co., Mont., Aug. 11, 1924; No. 1484 in the Canadian National Collection, Ottawa.

*Allotype*—♀, same locality, Aug. 12.

*Paratypes*—3 ♂, 1 ♀, same locality, Aug. 23, 29, Sept. 4; 1 ♂, Calgary, Alta., Aug. 22 (Dod).

Four other males from the same locality apparently represent a form of this species as they differ neither in antennal structure nor in genitalia. These specimens are rather evenly suffused with smoky, lacking the black basal dash, the sagittate marks before the s.t. line and the pale submedian dash found in the type series. The pale ochreous color, rather similar to that of *pallipennis* should render the species recognizable. There is a possibility that *cooki* may be identical with *orbicularis* Sm. described from a single female from Nevada, now in the collection of the Michigan Agricultural College; until, however, this specimen can be carefully studied the identity of Smith's species remains doubtful. It might be noted that *mitis* Sm. and its forms, which also occurs in Montana, has the same type of genitalia but differs in the strong serrations of the male antennae and the practically pure white hind wings.

Since writing the above I have received through the kindness of Mr. F. H. Benjamin a male specimen from Colorado (Bruce) which has been compared with the unique female type of *ducalis* Sm. from Stockton, Utah, and labelled as almost exactly agreeing in maculation. Judging by this specimen, *ducalis* should also be placed close to *perolivalis;* the antennae, with the exception of a few of the basal joints, are unfortunately broken off, but, as far as can be told, are as strongly serrate and fasciculate as in *cooki*; the maculation is much more clearly defined than in *cooki*, however, and in this feature is very close to that of *perolivalis*; from both species *ducalis* seems to differ in the more irregular s.t. line which shows strong indentations below costa and opposite the cell.

## DESCRIPTIONS OF TWELVE NEW SPECIES OF POLYMERUS FROM NORTH AMERICA (HEMIPTERA, MIRIDAE).*

BY HARRY H. KNIGHT,

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In my revision of eastern species of Miridae in the "Hemiptera of Connecticut," the generic name *Polymerus* was used for a group of species that

*—Contribution from the Department of Zoology and Entomology, Iowa State College, Ames, Iowa.

previously had appeared under the name *Poeciloscytus* Fieber. After working out several species in this genus I found that *proximus* Knight came exceedingly close to *Polymerus nigritus* (Fallen). It therefore became necessary to introduce the genus *Polymerus* in the Nearctic fauna, and at the same time place certain species that have been considered under *Poeciloscytus* Fieber. The increased number of species found in the Nearctic region soon presented difficulties in the way of separating the species into two genera.

Reuter (1909) indicated that *Poeciloscytus* and *Polymerus* could be separated only by rather doubtful characters, namely the length of hemelytra and degree of prominence in the clypeus. These characters vary slightly in each species and when a large number of species are considered it becomes impossible to separate them into two groups on this basis. Nine species of *Poeciloscytus* are listed in Van Duzee's Catalogue (1917), counting *americanus* (Reuter) which was placed as a synonym of *venaticus* Uhler. In the "Hemiptera of Connecticut" eight new species were described from the eastern United States, and taken with twelve species described in the present paper, the total number of species mounts to twenty-nine. Oshanin's "Katalog" (1912), lists five species of *Polymerus* and nine species of *Poeciloscytus,* making a total of fourteen species known from the Palearctic region. A total of twenty-nine species for the Nearctic region would seem to indicate this region as the center of distribution for the genus *Polymerus.* The large increase in species from North America brings out the impracticability of maintaining the genus *Poeciloscytus* Fieber (1858) which unites with the older genus *Polymerus* Westwood (1839).

**Polymerus chrysopsis** new species.

Distinguished by the red femora and bright red margins of the hemelytra; very suggestive of *gerhardi* Knight, except for the red margined hemelytra. In my key to the species of *Polymerus* this species runs to *fulvipes* on the character of the rostrum but is very different in other respects.

♂. Length 5.7 mm., width 3 6 mm. Head: width 1.17 mm., vertex .48 mm.; black, a rounded yellowish spot each side of vertex by the eye. Rostrum, length 1.24 mm., reaching slightly beyond middle of sternum, blackish, first and second segments more or less reddish. Antennae: segment 1, length .45 mm., thickness .14 mm.; II, 2.06 mm., cylindrical, thickness .115 mm.; III, .66 mm.; IV, .63 mm.; black, clothed with short, pale and fuscous pubescence intermixed. Pronotum: length 1.17 mm., width at base 2.06 mm.

Clothed with silvery white sericeous pubescence and intermixed with suberect pale yellowish pubescence. Black, moderately shining, embolium and more or less invading the corium apically, and cuneous, blood red; coxae and femora red, apices of femora and the tibiae black, trochanters and extreme base of coxae sometimes becoming fuscous; tarsi brownish black; posterior femora usually with a black patch on dorsal surface before the black apex, also two small dots of black on ventral aspect.

♀. Length 5.5 mm., width 2.8 mm.; very similar to the male in pubescence and coloration. Head: width 1.23 mm., vertex .58 mm. Antennae: segment I, length .46 mm.; II, 1.77 mm., cylindrical, thickness .08 mm., more slender than in the male; III, .68 mm.; IV .66 mm.; last two segments dark brownish. Pronotum: length 1.23 mm., width at base 2.2 mm.

*Holotype*: ♂ July 13, 1923, sand area near Jordan, Minnesota (H. H. Knight); Minnesota University collection.

*Allotype*: taken with the type; author's collection.

*Paratypes*: a large series taken with the type on *Chrysopsis villosa* which is the food plant of the species. ♀ June 12, 1922, University Farm, St. Paul, Minnesota (Wm. E. Hoffman), collected at light. NORTH DAKOTA—♂ ♀ July 12, ♂ July 14, 1920, Kidder (A. A. Nichol). ♀ July 15, 1920, Mohall (A. C. Burrill). SOUTH DAKOTA—♂ 2♀ June 24, 1923, Rapid City; 2♀ June 23, 1923, Philip; ♀ July 14, 1923, Spearfish (H. C. Severin). MANITOBA—2♀ July 3, 1920, Aweme (P. N. Vroom). ♂ June 26, ♀ July 10, 1922, Aweme (R. M. White). ♂ 2♀ June 22, 1922, Aweme (N. Criddle); Canadian National collection.

This is the most beautiful species of *Polymerus* known to me, the bright red of the embolium, cuneus and femora, standing in brilliant contrast against the black body. Strange to say, the contrasting red and black colors make the insect more difficult to see when on the host plant (*Chrysopsis villosa*). When disturbed the adult bug usually rushes to the base of a leaf stem, where it clasps its legs about the reddish stem of the plant in such a way that the black body with its covering of silvery pubescence suggests at first glance a bud in the branching stem of the plant.

### **Polymerus brevirostris** new species.

The short rostrum which scarcely attains the hind margins of front coxae places this species near to *gerhardi* Knight, but it is distinguished therefrom by the golden sericeous pubescence, pale embolium, and smaller size.

♂. Length 4.5 mm., width 2.2 mm. Head: width .97 mm., vertex .43 mm.; black, lower margin of juga reddish, a small yellowish spot each side of vertex next to the eye. Rostrum, length .88 mm., not reaching to hind margins of front coxae, reddish to fuscous. Antennae: segment I, length .46 mm., thickness .14 mm., black; II, 1.74 mm., thickness .114 mm., cylindrical, slightly constricted toward base, black; III, .71 mm., orange-yellow, fuscous apically; IV, .93 mm., fuscous, yellowish at base. Pronotum: length .96 mm., width at base 1.80 mm; basal margin slenderly yellowish, xyphus reddish.

Clothed with golden yellow sericeous pubescence, more silvery beneath, and intermixed with pale and fuscous simple pubescence; femora with pale pubescence. Black, embolium and usually the slender outer margin of cuneus yellowish; membrane black, veins yellowish. Legs orange to red, tibiae, tarsi, and apices of femora black, hind femora with indication of a subapical fuscous band on anterior aspect.

♀. Length 5 mm., width 2.6 mm. Head: width 1.08 mm., vertex .48 mm. Antennae: segment I, length .48 mm., thickness .14 mm.; II, 1.79 mm., thickness .10 mm.; III, .80 mm.; IV, .91 mm. Pronotum: length 1.12 mm., width at base 2 mm. Very similar to the male in pubescence and coloration.

*Holotype*: ♂ July 6, 1923, St. Paul, Minnesota (H. H. Knight), collected at light; author's collection.

*Allotype*: August 4, 1923, Trail County, North Dakota (A. A. Nichol).

*Paratypes*: ♀, taken with allotype. NORTH DAKOTA—July 19, 1920, Devil's

Lake. (T. H. Hubbell). SOUTH DAKOTA—♀ Sept. 6, 1923, Sylvan Lake; ♀ Sept. 6, 1923, State Game Park (H. C. Severin). WISCONSIN—♂, July, Polk County (C. F. Baker). MANITOBA—♀ Aug. 2, 1920, Aweme (N. Criddle). ♀ July 25, 1922, Aweme (R. M. White); Canadian National collection. ♂ July 9, 1916, Onah (J. B. Wallis); U. S. National Museum collection.

**Polymerus rubrocuneatus** new species.

Suggestive of *venaticus* Uhler, but distinguished by the uniformly black legs and blood red cuneus; also differs in the relative length of the first antennal segment as compared with the width of vertex.

♂. Length 5.9 mm., width 2.6 mm. Head: width 1.06 mm., vertex .48 mm.; black, a rounded pale spot each side of vertex next to the eye. Rostrum, length 1.16 mm., almost reaching to posterior margin of sternum, black. Antennae: segment I, length .48 mm., thickness .13 mm.; II, 2.09 mm., cylindrical, thickness .114 mm.; III, .60 mm.; IV, missing; uniformly black. Pronotum: length 1.14 mm., width at base 1.97 mm.

Clothed with silvery white, sericeous pubescence and intermixed with chiefly black simple pubescence. Body and legs uniformly black, moderately shining, cuneus and apex of embolium blood red.

♀. Length 5.1 mm., width 2.4 mm. Head: width 1.08 mm., vertex .60 mm. Antennae: segment I, length .43 mm., thickness .114 mm.; II, 1.79 mm., slender, gradually thickened from base toward apex (.10 mm. thick); III, .68 mm.; IV, .77 mm. Pronotum: length 1.03 mm., width at base 2 mm. Very similar to the male in pubescence and coloration.

*Holotype*: ♂ June 24, 1923, Rapid City, North Dakota (H. C. Severin); author's collection.

*Allotype*: ♀ July 5, 1922, Bozeman, Montana (W. C. Cook); author's collection.

*Paratypes*: 2♀, taken with the type. SOUTH DAKOTA—♂ "Brookings." ♂ July 12, 1923, Lead, (H. C. Severin). MANITOBA—♀ Aug. 5, 1924, Aweme, (R. D. Bird); Canadian National collection.

**Polymerus severini** new species.

Most closely allied to *fulvipes* Kngt., but differs from *fulvipes* in the longer rostrum and silvery sericeous pubescence; differs from *punctipes* in the shorter rostrum, uniformly bright yellow legs, and silvery pubescence.

♀. Length 5.4 mm., width 2.5 mm. Head: width 1.20 mm., vertex .60 mm.; broader and with front more tumid than in *fulvipes*. Rostrum, length 1.18 mm., reaching to a point halfway between middle and posterior margin of sternum, yellow, apex blackish. Antennae: segment I, length .46 mm., thickness .128 mm., black; II, 1.89 mm., cylindrical, thickness .085 mm., black; III, .74 mm., dusky yellow; IV, .93 mm., dusky. Pronotum: length 1.11 mm., width at base 1.97 mm.

Clothed with silvery white, sericeous pubescence and intermixed with yellowish to fuscous simple pubescence; legs clothed with yellowish pubescence, spines brown. Black, gula, xyphus, narrow basal margin of pronotum, and the embolium, pale to yellowish; cuneus reddish, central area and inner basal angle usually obscured with fuscous. Legs uniformly bright yellow, a spot on side of knee and the apical segment of tarsi, blackish.

*Holotype*: ♀ June 25, 1919, Brookings, South Dakota (H. C. Severin); author's collection.

*Paratypes*: ♀ "Minn." (Lugger); Minn. Univ. collection. ♀ July 8, 1921, Lake City, Minn. (A. A. Nichol). SOUTH DAKOTA—♀ June 24, 1923, Rapid City, (H. C. Severin). ALBERTA—♀ Aug. 2, 1923, Lethbridge, (H. E. Gray); Canadian National collection.

**Polymerus nubilipes** new species.

This species runs nearest to *fulvipes* Kngt., in my key to the species of *Polymerus*, but differs from that species in the uniformly black hemelytra, silvery pubescence, and in fuscous markings on the legs; size and dorsal aspect more nearly that of *opacus* Kngt., but differs in pubescence and color of the legs.

♀. Length 4.7 mm., width 2.4 mm. Head: width .97 mm., vertex .50 mm. Rostrum, length 1 mm., reaching to middle of sternum, blackish, yellowish on joints. Antennae: segment I, length .49 mm., thickness .114 mm.; II, 1.71 mm., cylindrical, thickness .071 mm.; III, .76 mm., fusco-brownish; IV, .86 mm., fuscous; black, last two segments lighter. Pronotum: length 1 mm., width at base 1.71 mm.

Clothed with silvery sericeous pubescence, becoming more or less golden brown on scutellum and clavus, the dorsum intermixed with simple fuscous pubescence; legs with yellowish pubescence, becoming fuscous on apical half of femora. Black, scarcely shining, veins of membrane and extreme tip of cuneus yellowish brown. Legs orange yellow, last tarsal segment and apices of tibiae blackish, tibiae shaded with fuscous for a space somewhat below the knee; apical half of femora shaded with fuscous on dorsal aspect, the infuscation broken as if by an incomplete subapical pale annulus.

*Holotype*: ♀ August 20, 1920, Two Harbors, Minnesota (H. H. Knight); author's collection.

*Paratypes*: ♀ July 1, St. Anthony Park, Minnesota; Minn. University collection. ♀ Aug. 19, 1916, Greenwood, Wisconsin (J. G. Saunders).

**Polymerus tumidifrons** new species.

Larger and more robust than *diffusus* Uhler, distinguished by the strongly tumid frons which is set off by a deep transverse sulcation at base of clypeus; female distinguished from *diffusus* female by the fact that scutellum, juga, coxae, and venter are always black, also by longer antennal segment I which is nearly equal to width of vertex.

♀. Length 5.5 mm., width 2.7 mm. Head: width 1.17 mm., vertex .62 mm.; frons strongly tumid, tylus also prominent, leaving a deep transverse sulcation at base separating tylus from frons; uniformly black except for the usual pale spots, one each side of vertex next the eye. Rostrum, length 1.35 mm., reaching to near hind margin of sternum, black, sides of first segment yellowish. Antennae: segment I, length .57 mm., thickness .128 mm.; II, 1.85 mm., greatest thickness .088 mm., slightly more slender near base; III, missing; black. Pronotum: length 1.20 mm., width at base 2 mm.; black, basal margin slenderly pale, collar beneath and anterior margin of coxal cavity, also pale.

Densely clothed with silvery sericeous pubescence, and intermixed with simple pale pubescence, a few golden yellow sericeous hairs on clavus and corium. Black, outer margin of cuneus, embolium and invading corium at base as far as

radius, pale; scutellum never with pale; membrane pale fusco-brownish, veins paler. Legs black, anterior tibiae with pale spot on anterior face before apex; tibiae pale on dorsal aspect although obscured by fuscous just before middle.

♂. Length 5.5 mm., width 2.4 mm. Head: width 1.11 mm., vertex .54 mm. Antennae: segment I, length .55 mm., thickness .114 mm.; slightly more slender near base; III, .74 mm.; IV, missing. Pronotum: length 1.17 mm., width at base 1.94 mm. Very similar to the female in pubescence, form, and coloration.

*Holotype*: ♀ July 31, 1920, Missoula, Montana (A. A. Nichol); author's collection.

*Allotype*: July 30, 1924, Gallatin County, Montana (Wm. C. Cook); author's collection.

*Paratypes*: ♀ July 1, 1920, Gallatin County, Montana; Mont. Agr. Exp. Station collection. 3♂ 6♀ July 27, Wasatch, Utah (E. A. Schwarz); Cornell University collection and U. S. National Museum collection.

### **Polymerus brevis** new species.

Distinguished by the broad head and short antennae; antennal segment II not equal to width of head across eyes; rostrum extending behind posterior coxae; black, embolium and cuneus white, clothed with prominent, erect simple pubescence.

♀. Length 4.2 mm., width 1.9 mm. Head: width 1.08 mm., vertex .59 mm.; nearly vertical, frons prominent, tylus not visible from above; black, basal carina and narrowly each side of vertex next the eye, pale; in addition to sericeous pubescence, beset with prominent, erect, bristly pubescent hairs. Rostrum, length 1.86 mm., extending behind posterior coxae, black, basal segment somewhat pale. Antennae: segment I, length .34 mm.; II, 1.03 mm.; III, .51 mm.; IV, broken; black, set with prominent pubescent hairs. Pronotum: length .91 mm., width at base 1.63 mm.

Clothed with silvery white sericeous pubescence, and intermixed with brownish to fuscous, erect, bristly pubescent hairs; spines on tibiae easily confused with the black bristle-like hairs. Black, cuneus, embolium and more or less invading outer margin of corium, pale whitish; membrane and veins fuscous; xyphus, lower half of collar, ventral margin of propleura, front coxae and apices of intermediate pair, pale; femora and hind coxae fuscous to blackish; tibiae fuscous, dorsal aspect except knees and apices, pale.

*Holotype*: ♀ June 1, 1921, Capa, South Dakota (H. C. Severin); author's collection.

### **Polymerus gracilentus** new species.

Distinguished by the slender form, long antennae, black body with slender orange colored legs, and white cubitus of the membrane with opaque white mark bordering apex of larger areole.

♂. Length 6.2 mm., width 2.1 mm. Head: width 1 mm., vertex .47 mm. Rostrum, length 1.17 mm., almost attaining posterior margin of the sternum, yellowish to black. Antennae: segment I, length .48 mm., thickness .09 mm.; II, 2.2 mm., cylindrical, thickness .85 mm.; III, broken; black. Pronotum: length .91 mm., width at base 1.53 mm.

Clothed with silvery white sericeous pubescence, and intermixed with more erect, simple whitish pubescence; pubescence of legs pale to yellowish

Black, moderately shining, pronotum very finely punctate, transversely rugulose. Membrane fusco-brownish, paler within larger areole bordering the white cubitus; near apex of larger areole where the cubitus changes to fuscous, there is a white opaque mark bordering the vein on outside of areole. Legs orange colored, a few small fuscous points forming about base of certain hairs on posterior aspect of hind femora; base of coxae, and the trochanters somewhat darkened by fuscous, tarsi and apices of the tibiae fuscous.

*Holotype*: ♂ June 11, 1915, Campo-Pine Valley, San Diego County, California (Harold Morrison); author's collection.

**Polymerus balli new species.**

Allied to *nigropallidus* Kngt., but the male differs in the thicker and orange colored segment II of the antennae, by having smaller eyes and wider vertex, and with antennal segment I not equal to width of vertex; pronotal disk with four longitudinal black vittae, clavus pale at base and apex but never for full length of claval vein.

♂. Length 4.5 mm., width 1.8 mm. Head: width 1.03 mm., vertex .44 mm.; yellow, collum, carina, median line of vertex and extending more broadly on frons, and tylus except narrowly at sides, black. Rostrum, length 1.45 mm., reaching to middle of intermediate coxae, yellow, apex blackish. Antennae: segment I, length .41 mm., thickness .128 mm., black; II, 2.2 mm., thickness .114 mm., cylindrical, orange yellow, constricted base blackish, clothed with short fuscous and pale pubescence; III, .71 mm., orange to dusky; IV, missing. Pronotum: length .86 mm., width at base 1.57 mm.

Clothed with silvery to golden, sericeous pubescence, and intermixed with simple pale pubescence. Ground color yellow to pale, sometimes greenish about head and pronotum, more pale on hemelytra; spot on anterior angle and four vittate rays on pronotal disk, mesoscutum and base of scutellum, clavus except base and apex, and a subdivided patch on apical area of corium, black; cuneus dusky on middle; membrane rather uniformly fuscous, veins yellowish to white, a small opaque white mark lying against apex of larger areole. Legs yellowish, posterior aspect of hind femora with two fuscous patches on subapical area, each composed of four or five small fuscous dots more or less joined; mark on knees, and the last tarsal segment blackish; hind tibiae with fuscous spot at base of each black spine.

♀. Length 5.1 mm., width 2.1 mm. Head: width 1.05 mm, vertex .48 mm. Antennae: segment I, length .40 mm.; II, 1.86 mm., slender, gradually thicker toward apex, blackish, brownish on middle of apical half; III, .80 mm.; IV, .66 mm. Pronotum: length .95 mm., width at base 1.8 mm. Very similar to the male in pubescence and coloration; frons with blackish nearly obsolete, but otherwise the black areas quite as extensive as in the male.

*Holotype*: ♂ Aug. 5, 1899, Kimball, Nebraska (E. D. Ball); author's collection.

*Allotype*: same data as the type.

*Paratypes*: 3 ♀, taken with the types. 5 ♂ ♀, "Colorado" (C. V. Riley collection); U. S. National Museum collection. ♂ July 5, 1923, Bestville, Sask. (Kenneth M. King). ♂ July 10, 1922, Lethbridge, Alberta (H. L. Seamans); Canadan National collection.

**Polymerus flaviloris** new species.

Allied to *unifasciatus* Fab., but differs in the larger size, longer antennae, and yellow lora; pubescence more silvery white than golden, anterior aspect of femora with two rows of black dots or streaks.

♂. Length 6.5 mm., width 2.6 mm. Head: width 1.08 mm., vertex .44 mm.; black, lora and spot on gena yellow, also with the usual yellow spots on vertex. Rostrum, length 1.7 mm., reaching to near posterior margins of intermediate coxae, yellowish, apex and more or less on first segment, blackish. Antennae: segment I, length .51 mm., thickness .118 mm.; II, 2.40 mm., thickness .10 mm., cylindrical; III, broken; black. Pronotum: length 1 mm., width at base 1.83 mm.

Clothed with pale or silvery sericeous pubescence, and intermixed with pale and blackish simple pubescence, the blackish pubescence conspicuous on the pale embolium. Black with pale and yellow; xyphus, lower half of propleura, slender basal margin of pronotum, tip of scutellum, embolium, basal half of corium exterior to radial vein, anal ridge and extending on clavus along claval vein at apex, white to yellowish; cuneus red, base and apex pale, narrow outer margin black for a space equal to the red; membrane uniformly fuscous, anal area darker, veins pale. Legs pale to yellowish and marked with black; coxae pale, with black spot at base; femora pale to yellowish, blackish at base and on trochanter, apical half with two rather indistinct blackish annuli which may appear broken by pale and resolved into spots, anterior aspect with two rows of black spots or streaks; tibiae yellowish, blackish on sides of knees and extending somewhat below, apices fuscous; tarsi blackish.

♀. Length 6 mm., width 2.7 mm. Head: width 1.17 mm., vertex .57 mm. Antennae: segment I, length .51 mm.; II, 2.2 mm., gradually thickened from base toward apex; III, .97 mm.; IV, .74 mm.; black, last two segments brownish black. Pronotum: length 1.27 mm., width at base 2.4 mm. Shorter and more robust than the male, the pale and yellow areas more extensive. Lora, genae, bucculae, and dorsal half of juga, yellow; legs paler than in the male although the rows of spots still apparent; venter nearly uniformly yellow, but fuscous about base of ovipositor and narrowly along vagina exterior; cuneus pale to yellowish and tinged with red on disk, sometimes distinctly reddish but rarely so strongly as in the male.

*Holotype*: ♂ July 15, 1908, Bozeman, Montana; author's collection.

*Allotype*: taken with the type.

*Paratypes*: ♂ July 8, 1908, Bozeman, Montana; Mont. Agr. Expt. Station collection. ♂ 2♀ August, 1913, Beaver Creek, Montana, alt. 6300 ft. (H. B. Hungerford); Kansas Univ. collection. ♀, "Colo. 1330" (C. F. Baker). 2♂ 1♀ July 28, 1877, Summit of Vega Pass, Colorado (C. V. Riley collection); U. S. National Museum collection. 2♂ 9♀ July 5—Aug. 7, Ute Creek Colorado (R. W. Dawson). 6♂ 13♀ Aug. 11, 1925, Ute Creek, Colorado (H. H. Knight). 3♂ Aug. 15, 1925, Dolores, ♀ Aug. 13, 1925, Mancos, Colorado (H. H. Knight). Found to occur on "toadflax." (*Linum Lewisii* Pursh.).

**Polymerus robustus** new species.

Allied to *uhleri* Van D., but size larger, rostrum shorter, and length of

antennal segment II not equal to width of pronotum at base.

♂. Length 5.3 mm., width 2.8 mm. Head: width 1.14 mm., vertex .54 mm.; frons and tylus less prominent than in *uhleri*, pale to reddish with black; collum, carina, middle of vertex, oblique lines on frons; tylus, juga, lower half of lora, black, genae and gula reddish. Rostrum, length 2.09 mm., reaching slightly beyond intermediate coxae, or to middle of hind coxae, reddish, apical segments becoming blackish. Antennae: segment I, length .44 mm., thickness .11 mm.; II, 1.96 mm., slightly more slender on basal half, thickness .087 mm., on apical half, distinctly more slender than in *uhleri* or *basalis*, reddish, black at base and becoming fuscous on apex; III, .71 mm., fuscous; IV, shriveled. Pronotum: length 1.20 mm., width at base 2.1 mm.

Clothed with golden sericeous pubescence, and intermixed with more erect stiff, black pubescent hairs, with silvery sericeous pubescence on sides of thorax. Color pale reddish testaceous, becoming darkened with blackish over certain areas; calli and more or less suffused over pronotal disk, and stripe across top of coxal cleft, blackish; mesonotum black, scutellum black at base and along sides, thus leaving median apical portion pale to reddish; clavus, embolium, and apical half of corium becoming obscured with fuscous; cuneus red, apex pale; membrane uniformly pale fusco-brownish, veins yellowish to red; sternum and pleura fuscous to black, lower half of epimeron and the ostiolar peritreme, pale. Legs reddish testaceous, basal one-third of femora blackish, but broken by longitudinal areas of paler ground color; apical half of femora marked on both anterior and posterior aspects with one or two large blackish patches and three or four smaller spots, but without a suggestion of forming annulations; tibiae reddish, paler on dorsal aspect, becoming blackish at sides of knees and beneath, tarsi fuscous; venter reddish, blackish beneath, sides with a subdorsal, longitudinal row of dark glabrous spots.

♀. Length 5.8 mm., width 3 mm. Head: width 1.18 mm., vertex .63 mm. Antennae: segment I, length .43 mm.; II, 2 mm., more slender than in the male; III, .84 mm.; IV, .68 mm. Pronotum: length 1.40 mm., width at base 2.31 mm. Larger and more robust than the male, and more uniformly reddish testaceous in color. Mesonotum, a mark across anterior angle of pronotum, frequently a line along basal magin of callus, collum, and median line of tylus, black; legs with infuscations much reduced, the black markings scarcely visible.

*Holotype*: ♂, Los Angeles County, California (Coquillett); U. S. National Museum collection.

*Allotype*: topotypic; Cornell University collection.

*Paratypes*: ♂ ♀, topotypic. ♀, "Cal."; Minnesota University collection.

This species appears to have been labeled by Uhler with the manuscript name *robustus*.

### **Polymerus delongi** new species.

Allied to *basalis* Reut. and *cuneatus* Dist., but differs in the nonannulate femora, longer rostrum, and shorter antennal segment II which is not equal to width of pronotum at base.

♂. Length 3.2 mm., width 1.5 mm. Head: width .84 mm., vertex .28 mm. Rostrum, length 1.74 mm., reaching upon sixth ventral segment, reddish

yellow, apex blackish. Antennae: segment I, length .26 mm., thickness .085 mm., yellowish; II, 1.11 mm., thickness 058 mm., on apical half, more slender on basal one-fourth, yellow, apical one-third fuscous; III, .74 mm., yellowish to dusky; IV, missing. Pronotum: length .65 mm., width at base 1.23 mm.

Clothed with fine golden yellow sericeous pubescence and intermixed with simple pale yellowish pubescence. Color rather uniformly pale reddish brown, appearing tinged with hypodermal red; tylus fuscous, more strongly toward apex but with extreme apex pale, vertex yellowish, juga and lora tinged with hypodermal red. Pronotum rather uniformly brownish and tinged with reddish, each anterior angle with a prominent round blackish spot; lower margins of propleura becoming pale. Scutellum pale reddish brown, apex becoming pale, mesonotum narrowly exposed, fuscous. Hemelytra yellowish, tinged with hypodermal red, radial vein appearing as a fine fuscous line; clavus with inner half distinctly darker, although not strongly fuscous; cuneus yellow, inner half with hypodermal red; membrane uniformly fuscous, veins pale, narrowly pale, bordering apex of cuneus. Sternum and pleura fusco-reddish, margin of epimeron and the ostiolar peritreme pale. Legs yellowish, coxae and femora tinged with hypodermal red, hind femora strongly dark reddish, paler at base and narrowly at apex, without indication of annulations; tibiae uniformly pale yellowish, spines yellowish; tarsi yellowish, apical segment fuscous. Venter yellowish to red, more yellowish on sides near base, becoming fuscous on genital segment beneath.

*Holotype*: ♂ April 6, Paradise Key, Florida (D. M. DeLong); author's collection.

## **Polymerus americanus** (Reuter).

1876 *Systratiotus americanus* Reuter, Ofv. Kongl. Sv. Vet.-Akad. Forh., xxxii, No. 9, p. 73.

This species appears in Van Duzee's Catalogue as a synonym of *venaticus* Uhler. While working in the U. S. National Museum, back in 1915, I ran across two specimens in the C. V. Riley collection labeled "Texas, Belfrage" which I feel certain represent some of the type material of *P. americanus* (Reuter). At that time I made notes and drawings which should enable me to recognize the species when next I see it. Although I have seen considerable material collected in Texas and elsewhere the species has not turned up again. Recently, upon writing Mr. W. L. McAtee and asking him to locate the particular specimens which I had named and replaced among miscellaneous material of the Riley collection, he reports being unable to find them.

My drawings of *americanus* show a strongly produced head, even more so than in *basalis* Reuter. The first segment of the rostrum extends back beyond base of head, but unfortunately I did not indicate the complete rostrum, which no doubt will be found to extend back upon hind coxae or slightly beyond. My sketch of the dorsal aspect of the head shows the triangular pale mark on median line at base of vertex, a character mentioned in the original descrpition, and which I find absent in all other known chiefly black species. These characters combined with bright red cuneus, line of white spots on venter of female, and pale marks on femora and coxae, should enable one to recognize *americanus* Reuter when it turns up for study.

# FOUR NEW NEARCTIC DIPTERA.*

BY C. H. CURRAN,
Ottawa, Ont.

STRATIOMYIDAE

## **Odontomyia megantica** n. sp.

Thorax of ♂ wholly black, the scutellum with a narrow yellow border except basally, confined largely to the lower edge, the ♀ with the sides of the mesonotum behind the suture narrowly yellow or green, the margin of the scutellum wholly fairly broadly yellow.

Length, 10.5 to 12 mm. *Male.* Head shining black, the narrow posterior orbits except above and below, yellowish; face prominent, moderately acute below; eyes touching for a distance equal to the length of the ocellar triangle. Pile of head long, yellow, short and black on vertical triangle. Occiput greyish yellow pollinose. Antennae black, the third joint with parallel sides, rather slender, slightly longer than the first two, the second almost half as long as the first, the basal two with rather long yellowish pile. Labellae short and broad, not over three times as long as wide.

Thorax shining black, with rather long, abundant yellowish pile, the lower calypter reddish, with yellow pile. Wings distinctly brownish luteous, darker about the veins.

Femora black, their apices narrowly yellow; tibiae yellow, the front four sometimes narrowly darkened about the middle, the hind ones with the apical two-thirds black, their tip pale; tarsi reddish with the last two or three joints brown.

Abdomen black; the first three segments sub-opaque, clothed with abundant reddish or reddish yellow pile; the narrow sides of the first segment, a moderately large, sub-triangular spot on the second, the base of the spot shortly transverse, the inner margin slightly convex, the inner posterior end acute, and an elongate transverse triangle on the apex of the third segment yellow, rarely greenish. The spot on the second segment is longer along the lateral than along the posterior margin.

*Female.* Post-orbits broad, greenish yellow, the narrow facial orbits, expanded just above the antennae, and the vertex and front of the same color; the front with an incomplete, usually interrupted black fascia on the lower fourth, which is often connected (or the inner arms of the spots connected) with the black about the base of the antennae; there is also a wider black fascia connecting the upper corners of the eyes, which may emit a black stripe to the vertex behind the ocelli. On either side of the face along the suture is a sub-triangular yellow spot which is widest in its middle, the lower edge straight, this spot never connected with the pale orbits.

Thorax clothed above on the anterior two-thirds with some golden brown tomentum, in addition to the rather short, not abundant luteous pile. In addition to the posterior side margins there is a narrow fascia just behind the propleura and a wider oblique one running from below the squamae to above the posterior coxae and the posterior border of the mesopleura are green.

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*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. Agriculture, Ottawa, Ont.

The narrow margin of the abdomen is brownish green and the spots on the second segment are slightly larger and a little more rectangular.

The legs in both sexes may vary somewhat and especially in the ♀ the anterior four tibiae are usually broadly dark apically as well as in the middle.

*Holotype*— ♂, Megantic, Quebec, June 20, 1923, (Curran), No. 700, in the Canadian National Collection, Ottawa.

*Allotype*— ♀, same data.

*Paratypes*— 9 ♂, Megantic and Woburn, Que., June 19-22; 4 ♀ same localities and dates and 1 ♀, Orillia, Ont., May 30, 1920, (Curran).

All the specimens from Quebec was collected close to Lake Megantic. The males were common at Woburn hovering high in the air during a strong wind; at Megantic the specimens were taken on an umbelliferous plant.

Paratypes are deposited in the collection of Mr. C. W. Johnson.

### Odontomyia johnsoni n. sp.

Similar to the preceding but readily distinguished in either sex as shown below:

Length, 10 to 11 mm. *Male.* Differs from *megantica* in having the pair of spots on the second segment more deeply concave on the inner edge. The labella is narrow and about five times as long as wide. This is the only character which can be used with certainty and offers an excellent means of separation.

*Female.* In addition to having narrower labellae, the greenish fascia on the lower part of the face is continuous just below the apex of the prominence and towards the side it spreads out to form a large spot on the slopes, the pale color on the middle of the face being separated from the orbital pale color by a wide black line; there is also a pale spot at the side of the oral opening in front, below the facial depression; the black fascia before the vertex is wider and expanded caudad at the middle. On the abdomen there is also a narrow transverse stripe on the sides of the apex of the fourth segment.

*Holotype*— ♂, Mississippi Agricultural College, Apr. 10, 1922, (F. M. Hull); Allotype, ♀, same locality, April 16, 1922, (Hull), in the Collection of C. W. Johnson.

*Paratypes*— ♂, ♀, Opelousas, La.; No. 701, in the Canadian National Collection, Ottawa.

Mr. Johnson sent me these specimens as they traced out to *megantica* in a manuscript key I forwarded to him. Only careful study revealed constant differences between the two species which are very distinct.

SYRPHIDAE

### Volucella barei new species.

Face and antennae reddish; thorax greenish blue with fiery violaceous reflections; abdomen brilliant blue-green.

Length, 10 mm. *Male.* Face and the small frontal triangle shining rusty reddish; oral tips, posterior half of cheeks and obscure stripe on front of cheeks, brown, or blackish; vertical triangle brown, small, the large ocelli reddish; occiput black. Eyes yellowish pilose, the facets on upper half much enlarged; vertical triangle black pilose; occiput, cheeks, face and front with short yellowish pile. Face concave above, the lower half produced downwards and forwards as a mod-

erately long, sharp, cone, the tubercle conspicuous, broad. Antennae reddish; third joint narrowed on apical half; arista yellow, with black apex and rays.

Thorax cyaneous, the mesonotum and scutellum, rather dull greenish, with brilliant purple reflections; humeri, margin behind the suture and the posterior calli, brownish red; margin of scutellum blue. Pile of thorax black, somewhat coarse, the mesonotum and disc of scutellum with fine yellow pile intermixed. No prescutelar bristles; scutellum with four pairs of marginals on the sides.

Femora black, with broad reddish apices; tibiae brownish red, with reddish ends; tarsi reddish, with the apical two joints brown. Pile of legs wholly black, only the tarsal pads yellow.

Wings tinged with luteous anteriorly, slightly cinereous behind, stigma luteous with transverse, brownish basal spot. Upper lobe of squamae yellowish, with rusty border; the lower lobe rusty reddish, much swollen, especially outwardly, the fringe yellow.

Abdomen, including the venter, bright green, yellowish pilose, the entire margin with longer, coarser black pile.

*Holotype*— ♂, Texas, June; No. 1417 in the Canadian National Collection, Ottawa.

*Paratype*— ♂, McPherson Co., Kansas, June 26, 1923, (Clarence Bare); in Kansas University Collection.

TACHINIDAE

**Fabriciella lutzi** new species.

In Tothill's table of species (Can. Ent., LVI, 259) traces to *acuminata* Toth. but the posterior forceps are very different in shape, and, while their dorsal surface is flat, they are actually intermediate between the group with flat forceps (*dakotensis*) and the group with compressed forceps (*algens* and *piceifrons*). The forceps have rather parallel sides and are obtusely rounded at the apex, the end bent in such a way as to appear truncate except from apical view. the sides beneath the lower surface concave and receding.

Length, 13 mm. *Male.* Face, and cheeks yellowish in ground color. Head silvery white pruinose; frontal vitta rusty brown. Width of front one and three sevenths greater than length of second antennal joint; parafacial five-sevenths as wide as length of second antennal joint. Hair of occiput yellow, of cheeks yellow, coarse, with some black hairs intermixed, the parafacials with coarse yellow hair on lower half, black above. Front with fine yellow hairs along the orbits. Cheeks one half as wide as eye height. Palpi yellowish. Antennae reddish, third joint blackish.

Mesonotum rather thinly cinereous pollinose, the vittae moderately distinct; humeri and lateral margins rusty reddish. Scutellum rusty reddish.

Legs black. Wings cinereous, yellowish antero-basally. Squamae white; halteres orange.

Abdomen rusty yellow, darker apically; with a narrow median black vitta which is broadly interrupted on the third and fourth segments or narrowly so on the third, the spot on the third segment triangular, widest at apex, the fourth segment black on apical half. Bases of second to fourth segments broadly white

pollinose, the second less widely so. Genitalia black. Intermediate abdominal segments without discals.

*Holotype*— ♂, Rifle, Colo., July 19-21, 1919, (F. E. Lutz); in the American Museum of Natural History.

*Paratypes*— ♂, same data, No. 1443 in the Canadian National Collection, Ottawa; ♂, near Lander, Wyo., August, Roy Moodie, in Kansas University Museum.

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## NOTES ON SALDULA OBSCURA PROV. WITH DESCRIPTION OF A NEW SPECIES (HEMIPTERA).*

BY J. MCDUNNOUGH,
Ottawa, Ont.

In the December number of the "Canadian Entomologist" for 1924 (p. 300) J. R. de la Torre-Bueno recorded the species *Saldula* (*Acanthia*) *obscura* Prov. from Alberta and Saskatchewan, claiming that it is distinct from *littoralis* L., as placed by Van Duzee. In this latter statement he is correct but unfortunately his identification of the species is erroneous. Recently Mr. H. L. Viereck has had the opportunity of carefully studying Provancher's type and comparing it with material from the Canadian National Collection. The type is a macropterous female and a specimen from Anticosti Island before me has been labelled by Mr. Viereck as agreeing in all particulars with this type. It is easily recognizable by its shiny-black glabrous surface, approaching closely in this respect to *coriacea* Uhl. which, however, is generally larger and broader and has much more convex hemielytra, especially in the brachypterous form, with fine yellowish pubescence on head and thorax and in the female sex, at least, without the pale basal areas to the femora or the white margined terminal abdominal segment, which are quite characteristic of *obscura*. A second specimen before me, without any definite locality label but probably from eastern Canada, seems to represent the brachypterous female, agreeing with the Anticosti specimen in every respect except that the pronotal callus and the hemielytra are decidedly more convex. Two other western females from Waterton, Alta., and Crow's Nest Pass, Alta., also appear to belong here; they are somewhat darker than the eastern specimens, one being entirely without pale markings on the head. I have seen no males.

I have drawn up the following description of *obscura*, following the method used by Torre-Bueno in the above mentioned paper.

### **Saldula obscura** Prov.[1]

*Female*. *Head*: In natural position, as seen from above, one quarter wider than long, two small, wedge-shaped, yellow, glabrous calli, narrowing anteriorly, next the eyes, and beginning on a line drawn behind and tangent to the ocelli; back of head scabrous, without pubescence; vertical sulcus obsolescent; the front scabrous, with very sparse yellowish pubescence, the two transverse, glabrous, converging calli black, rather improminent. Eyes converging anteriorly, slightly longer than their farthest distance apart, ocelli contiguous, on a line with the

*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

1.—I use the generic term *Saldula*, following opinion 81 of the International Commission on Nomenclature.

glabrous wedge; antennae subequal to the length of the head, thorax and scutellum taken together, segment I stoutest, shortest, slightly curved, set with a few fine spines or coarse bristles; II as long as the head, thickened slightly apically, slender, pubescent, with a few apical bristles; III somewhat longer than IV, both of similar thickness to apical portion of II, pubescent and with scattered black bristles; formula: I to II to III to IV as 5 to 13 to 10 to 8; a pronounced tubercle (jugum) anterior to the insertion of the antennae and adjoining the tylus, inner half next the tylus yellow, outer portion black. Rostrum going beyond the middle coxae, of the typical structure; clypeus black pointed, noticeably longer than wide.

*Prothorax*; glabrous, shiny, about twice as wide posteriorly as long at the median line, anteriorly about as wide as long, deeply excavate posteriorly; callus well defined by a lunate punctate posterior sulcus, ending in a deep fovea near the outer margin, only slightly raised above the remaining area and with only a trace of a depressed central fovea, surface faintly scabrous; posterior portion of prothorax finely rugulose. Scutellum glabrous, slightly longer than broad, the transverse impression slightly nearer the base than the apex, the part anterior to the impression more or less shagreened and the posterior coarsely transversely rugulose.

*Hemielytra*: shiny black, glabrous, veins obsolescent, except the claval suture and the main corial vein, the others represented by thickenings of the corium; membrane unicolorous dark brown with four cells, the apex of the first set about one sixth above the apex of the second, the fourth cell widest; corial margin widest on a line drawn just behind the apex of the scutellum, explanate, wider than the thorax and with a narrow reflexed edge; commissure about two thirds the length of the scutellum.

*Legs*: anterior femora but slightly thicker than the others, about twice as stout as tibiae, which are slightly enlarged apically; tibia subequal to femur; coxa two fifths as long as tibia; second and third tarsal segments subequal; claws simple, moderate; tibiae set with bristles and pubescent. Middle femora of same proportional stoutness, equal to tibiae; tarsal segments 2 and 3 subequal; tibia set with bristles and spines, which are quite abundant at the extremity and extend to the tarsi. Third femora of the same proportional thickness and same vestiture as others, about two thirds as long as tibiae; third tarsal segment two thirds length of second; tibial and tarsal spines as in other segments, claws similar.

*Abdomen*: Female, simple, the terminal rounded segment as long medially as the preceding two taken together; segments four to six of equal length throughout and subequal to each other; segment three medially of equal length to the others, but slightly longer at the connexivum, where it is subequal to segment two; structure of segment one concealed by coxae; polished black with fine pubescence; extremity of seventh segment conical-truncate in outline, ovipositor projecting beyond it to the apex of membrane.

Length to tip of membrane, 6.7 mm.
Greatest width, 3 mm.
Head (from above) long, 1.1 mm.; wide, 1.4 mm.
Thorax, long, .9 mm.; width, anterior, .9 mm.; width, posterior, 2 mm.
Scutellum, long 1.4 mm.; wide, 1.2 mm.

*Color Pattern*. Head entirely black with the exception of small calli next the eye, on a line with the ocelli, and portions of the juga next the tylus which are yellow. Thorax, scutellum and hemielytra, black, shining, glabrous, membrane unicolorous black-brown with two-thirds of the outer margin broadly blackish. Antennae with the first joint black with a yellow streak on inner side, second joint black-brown with the upper surface yellow, third and fourth joints black-brown. Sternum and abdomen black with the intersegmental areas narrowly brownish and the lamellar projections over first two pairs of coxae yellowish-white; margin of last abdominal segment yellow-white. Anterior legs with the basal half of the coxa blackish, apical half yellow-white, femur blackish with basal one fourth yellow-white, extreme apex of femur, upper surface of tibia (except apex) and first two tarsal joints orange-yellow, apex of tibia and last tarsal joint blackish, the under surface of the tibia dull brownish. Mid and hind legs similar to forelegs except that fully one half the femur is pale yellow-white and the bases of the coxae are less intense black; the hind femur shows slightly brown sprinkling near the apex of the pale area.

Owing to the above correction the species from Alberta, referred to *obscura* in the above mentioned paper, is without a name. It is at once distinguished from both *coriacea* and *obscura* but its dull black coloration, the shiny appearance of the other two species being entirely lacking. From *obscura* it further differs in the presence of yellowish pubescence on the prothorax, and the female lacks the pale areas on the femora found in the same sex of *obscura*. In shape it is much more slender and the hemielytra less convex than in *coriacea;* the lamellar projections over the fore coxae are practically entirely whitish, whilst in *coriacea* only the apical portion is pale; in the females the apical margin of the last abdominal segment is pale but in *coriacea* concolorous with the remainder of segment. The male agrees quite well with Say's description of *lugubris* from Missouri, a species which Mr. Torre-Bueno tells me has never been satisfactorily identified; under the circumstances it seems advisable to give our Alberta species a name and I therefore offer the following detailed description:

**Saldula buenoi** n. sp.

*Male. Head*: Length, as seen from above, 1 mm.; width 1.2 mm.; black, scabrous, clothed with rather dense, fine whitish or yellowish pubescence except on vertex which is nearly glabrous; two small wedge-shaped calli next the eyes on a line with the ocelli, two oblique calli anterior to the eyes, the juga and the central portions of the tylus and epipharynx, pale to dark yellow. Vertical sulcus obsolescent, indicated by two faint prominences on each side of the median line behind the anterior margin of the eyes. Rostrum blackish, extending to just beyond mid-coxae. Antennae with joint I stout, short, dull yellow, blackish beneath and at base, set with sparse black bristles; II dull yellow, slender, slightly thickened apically, pubescent, with scattered long bristles; joints III and IV subequal, deep black-brown, similar to preceding joint in vestiture. I is to II to III to IV as 11 to 30 to 19 to 18.

*Prothorax*: Dull black, clothed with fine dull golden pubescence, scabrous, somewhat rugulose along exterior margins, moderately excavated posteriorly, callus defined posteriorly by a curved punctate sulcus, rather obscured by the pubescence, gently rounded above the level of the posterior portion of the pro-

thorax and with mere traces of a central fovea; outer margin explanate, nearly straight; width, anterior, 1 mm.; posterior 2.1 mm.; length, 1 mm.

*Scutellum*: Dull black with sparse pubescence, the transverse impression slightly nearer the base than the apex, anterior portion scabrous, posterior one rugulose; width 1.4 mm.; length 1.3 mm.

*Hemielytra*: Dull black, very faintly pubescent, more especially at base and along outer margin; a faint pale spot (at times quite distinct) on the inner side of the main corial vein at apex; greatest width on a line drawn just behind the apex of scutellum. Membrane deep black-brown, only slightly paler than hemielytra, with four cells, the apex of the first set slightly above that of the second, faint paler brown spots at the apices of cells 2-4 and sometimes similar spots in the basal area.

*Legs*: Coxae black with yellow apex; lamellar projection over anterior coxae entirely whitish or yellowish, over mid-coxae black with narrow pale apical border; femora yellow, the fore femora with a broad blackish stripe on the outside, the mid and hind femora with slight black shading apically and with faint sparse brownish dots; tibiae slightly darker yellow than the femora, especially the hind ones, black apically; second tarsal joint yellow, third deep black-brown.

*Abdomen*: Unicolorous black with faint pubescence.

Length to tip of membrane 6.7 mm.; greatest width 3 mm.

*Female*: Very similar to the male but differing as follows: joint I of antenna is largely black and joint II deep black-brown, similar to III and IV, occasionally paler on upper surface. The femora are blackish with the exception of a pale yellowish apex and the tibiae are deep brown, slightly tinged with yellow on upper surface. The apical margin of the last abdominal segment is broadly truncate and slightly tinged with whitish. Length to tip of membrane 7.4 mm.; greatest width, 3.5 mm.

*Holotype*— ♂, Waterton Park, Alta., June 30, (J. McDunnough); No. 1419 in the Canadian National Collection, Ottawa.

*Allotype*— ♀, same data.

*Paratypes*—8 ♂, 10 ♀, from same locality captured by J. McDunnough and H. L. Seamans on June 29th and 30th.

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## NOTE ON A SECONDARY EGG PARASITE OF THE CELERY LEAF-TYER.

In the Canadian Entomologist for August, 1922 (p. 174) the statement was made, through what now proves to be a clerical error in copying, that *Syntomosphyrum modestus* Houd. was reared by B. L. Boyden from *Phlyctaenia rubigalis* Guen. (=*Ph. ferrugalis* Hbn.) and that it was an egg parasite of that pest. Mr. Boyden recently has kindly called my attention to the fact that it is not an egg parasite of *Ph. ferrugalis* and not so reported by him, but a secondary parasite on *Microgaster congregatiformis* Vier.

F. H. CHITTENDEN.

Mailed October 24, 1925